

COVER STORY: CANNON

SEPTEMBER 14, 1958

# TIME

THE WEEKLY NEWSMAGAZINE

SPACE AND THE  
RADIATION BELT



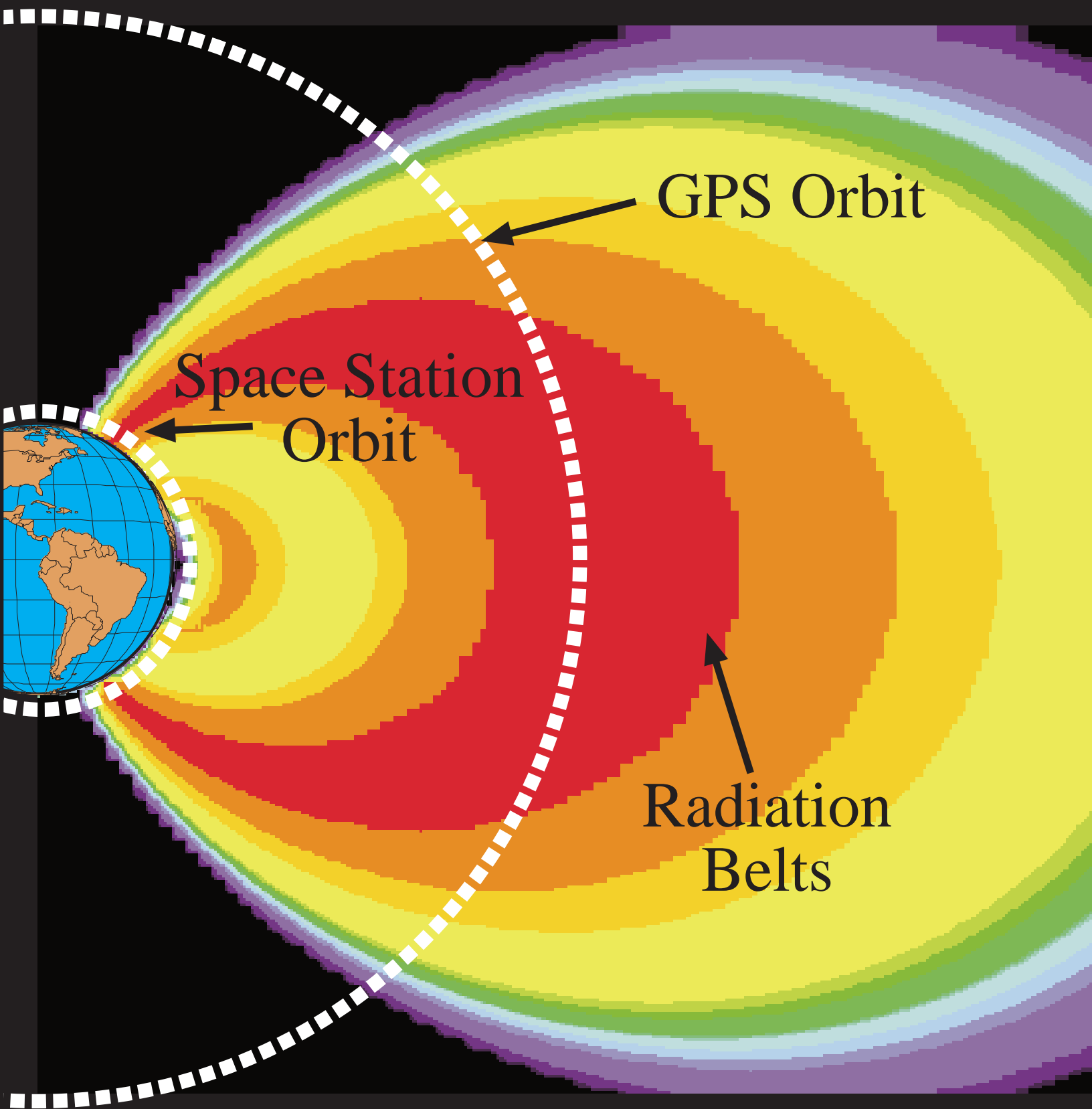
PHYSICIST  
JAMES VAN ALLEN

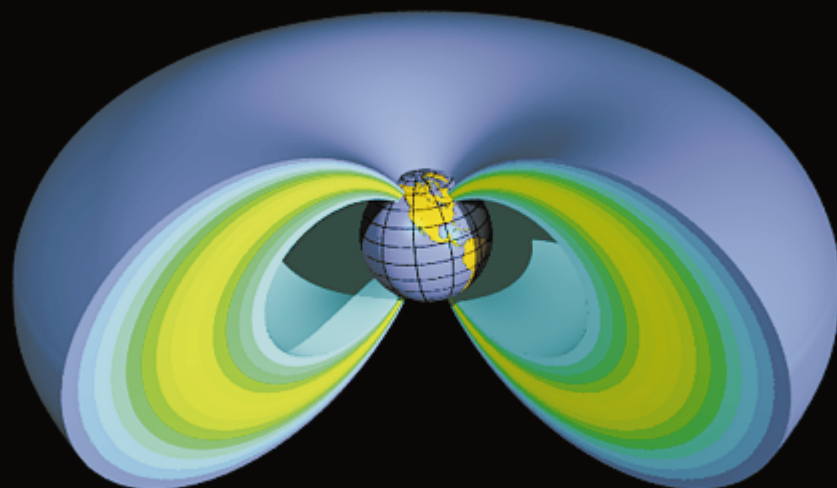
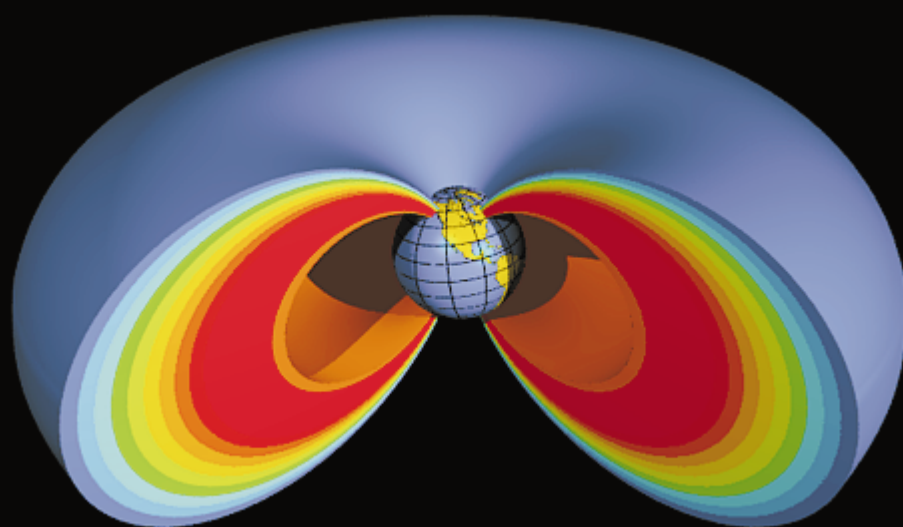
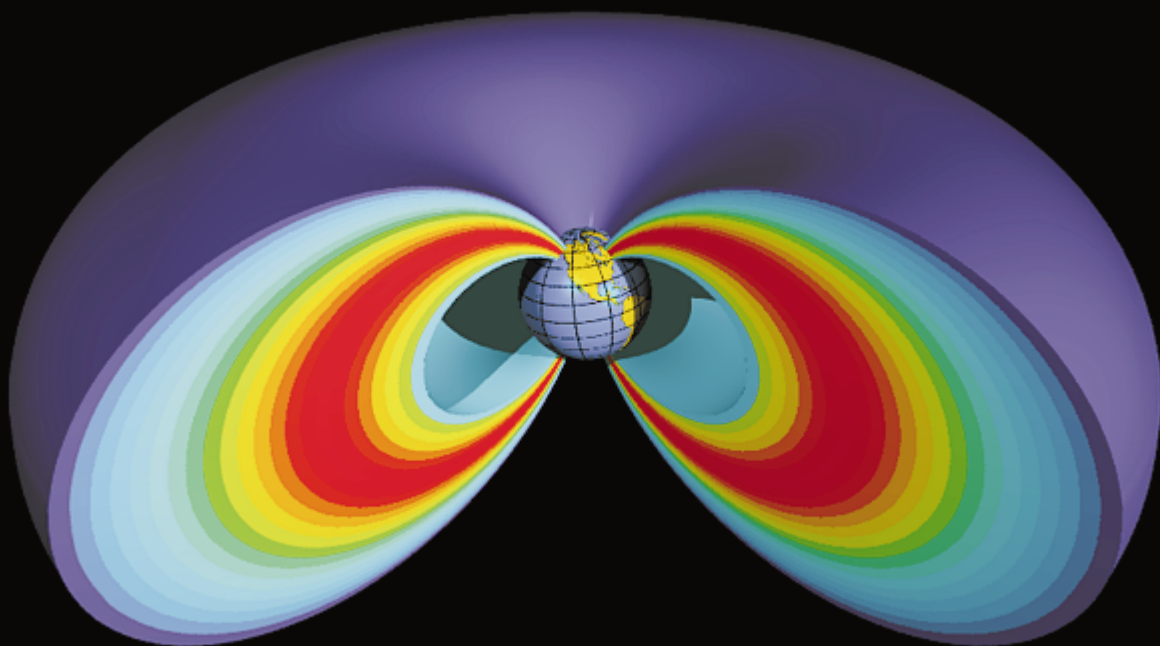


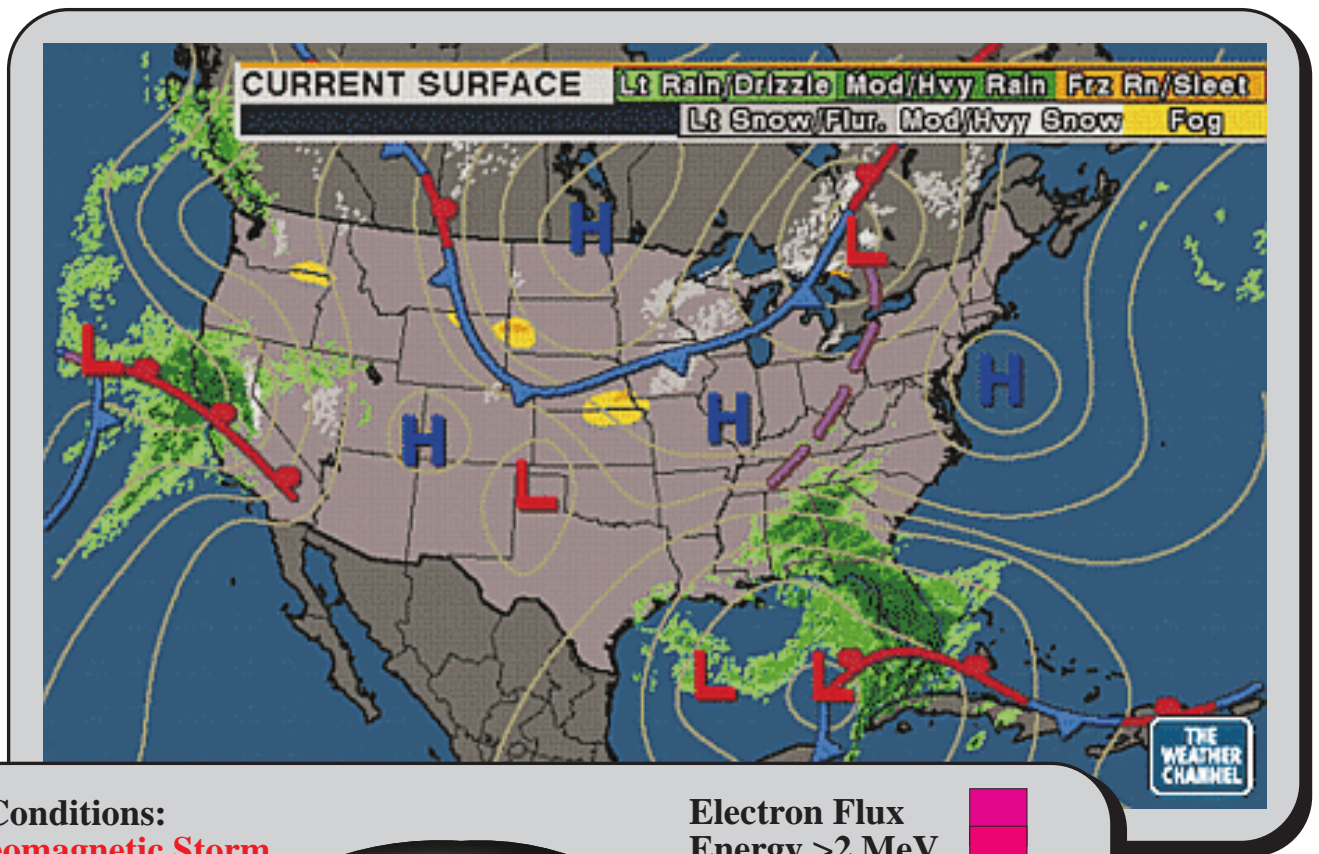
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# AE-8 Standard Radiation Belt Model







**Current Conditions:**

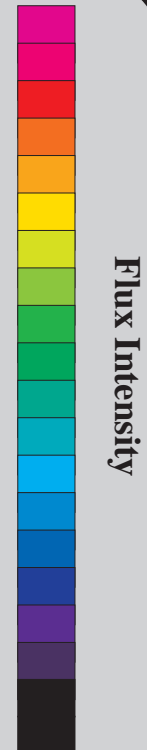
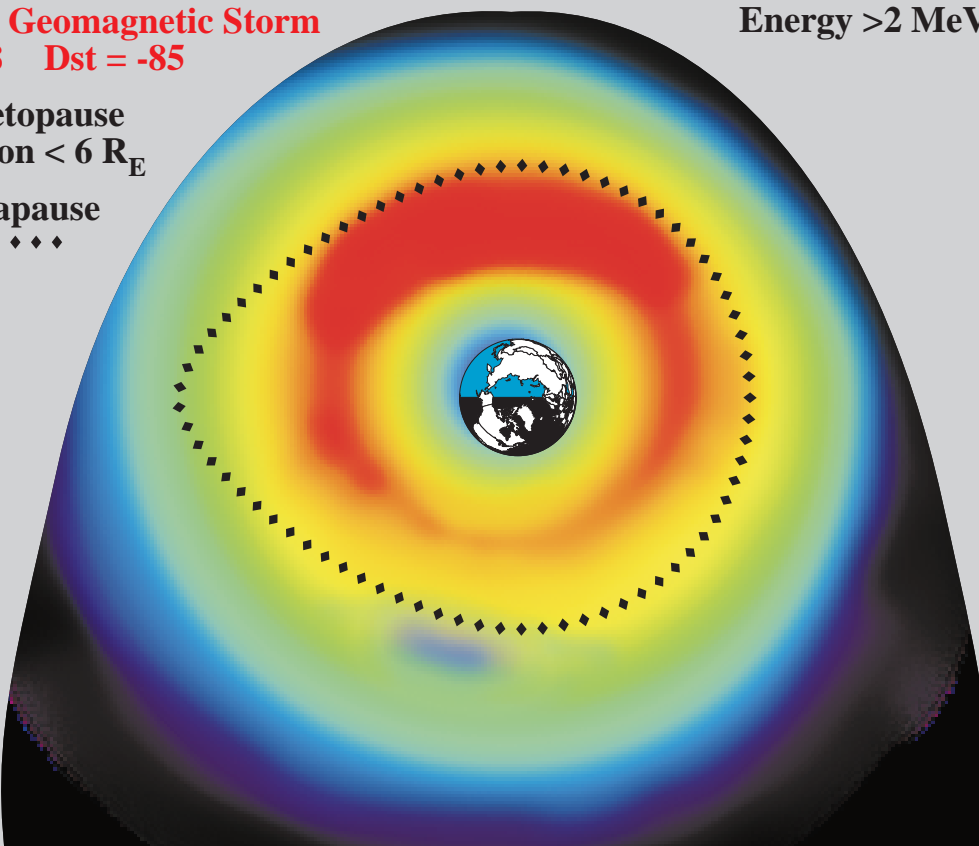
**Severe Geomagnetic Storm**

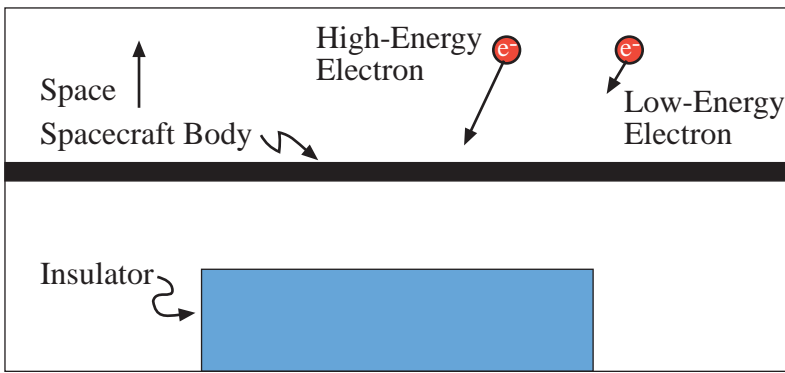
**Kp = 8 Dst = -85**

**Magnetopause**  
Location < 6 R<sub>E</sub>

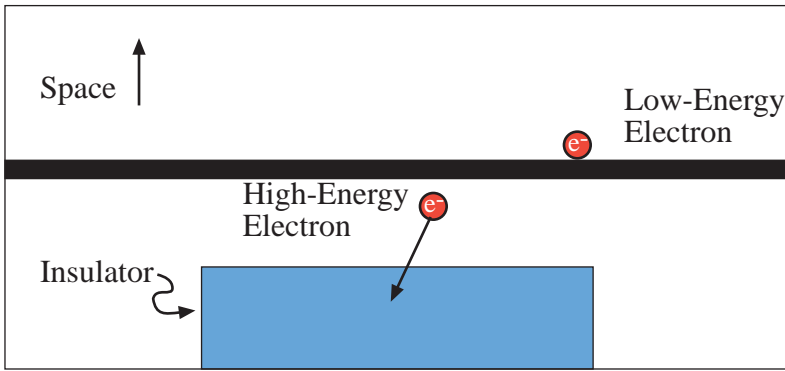
**Plasmapause**  
♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦

**Electron Flux**  
Energy >2 MeV

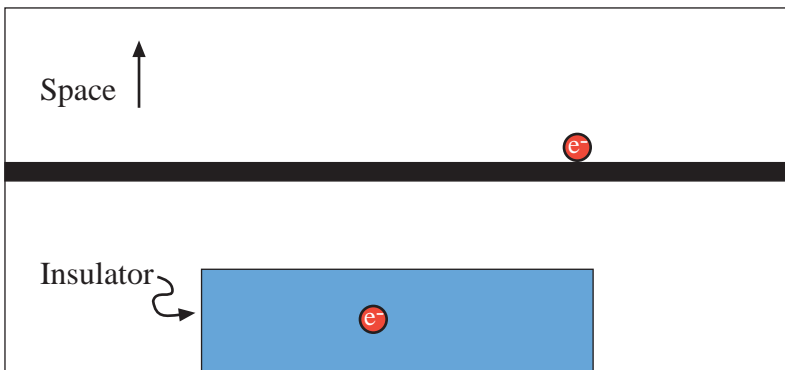




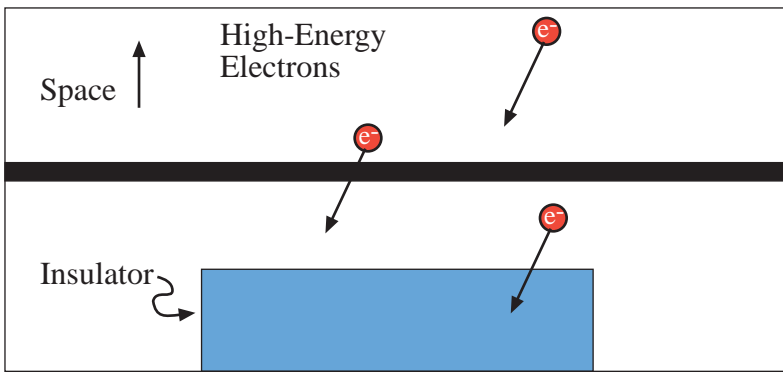
Low-energy electrons “stick” to the spacecraft surface.



High-energy electrons penetrate the satellite and can get embedded in insulating materials

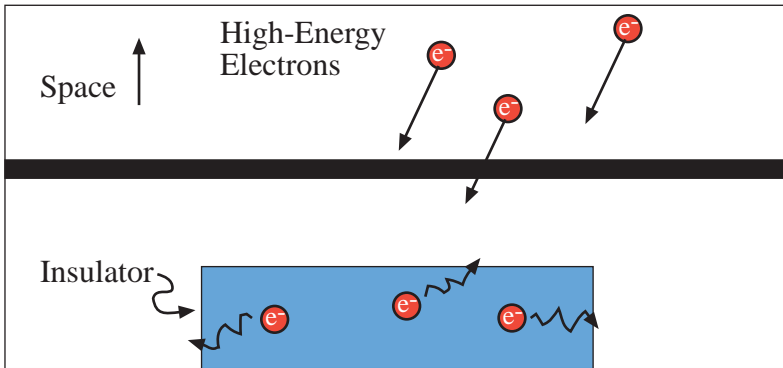




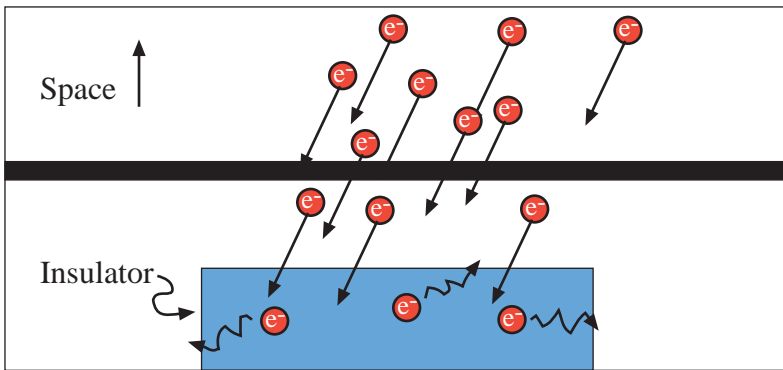


Now this figure is only for high-energy electrons

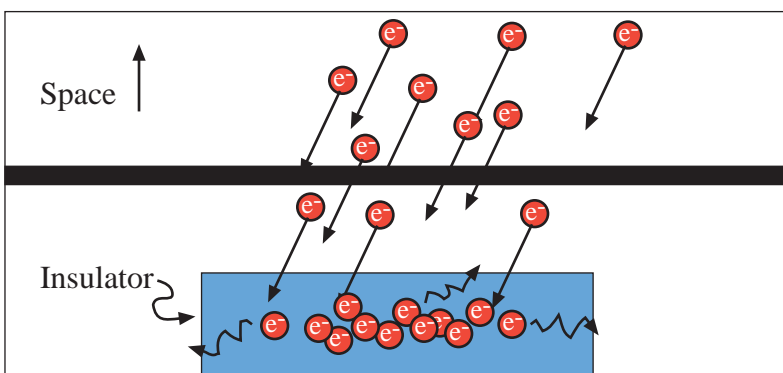
A) The electrons come in and burry themselves in the insulator



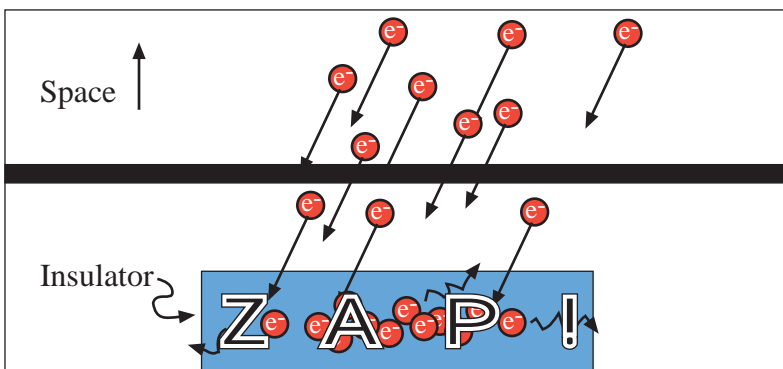
B) They can slowly leak out of the insulator. So, if the rate of electron influx is less than or equal to the leakage rate very little charge builds up.



C) If the radiation belts get more intense the influx of electrons increases to levels higher than the leakage rate.



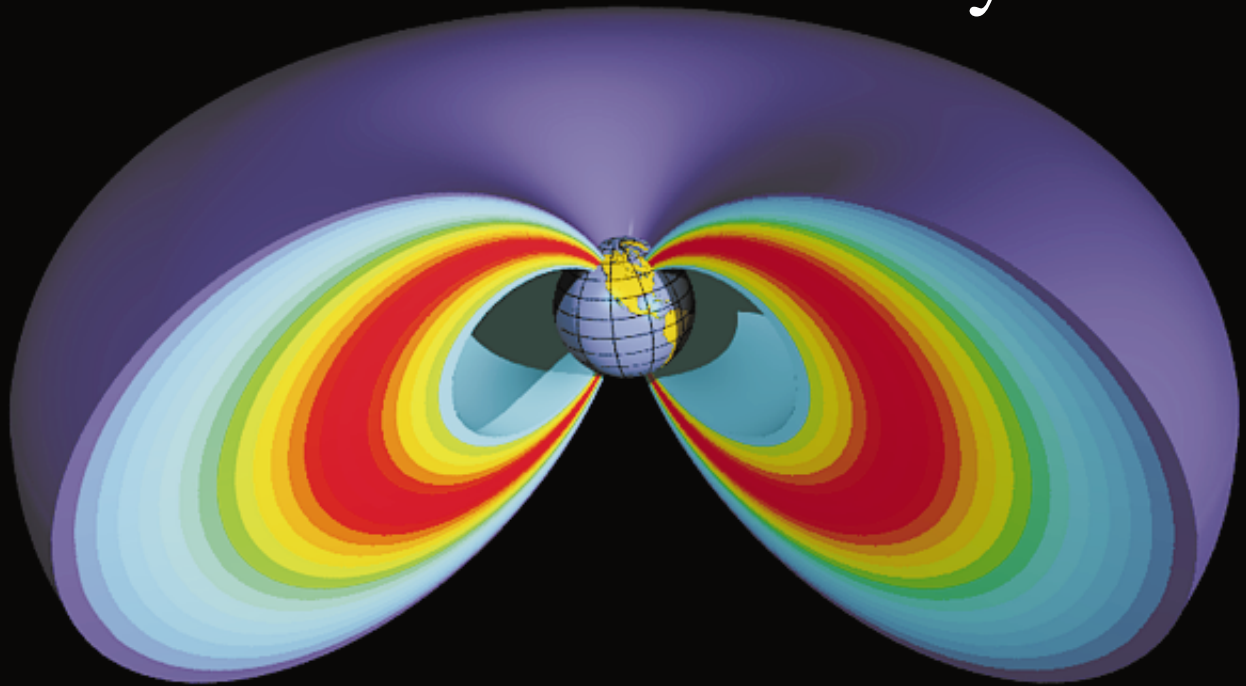
D) Now electrons build up in the material faster than they leak off.



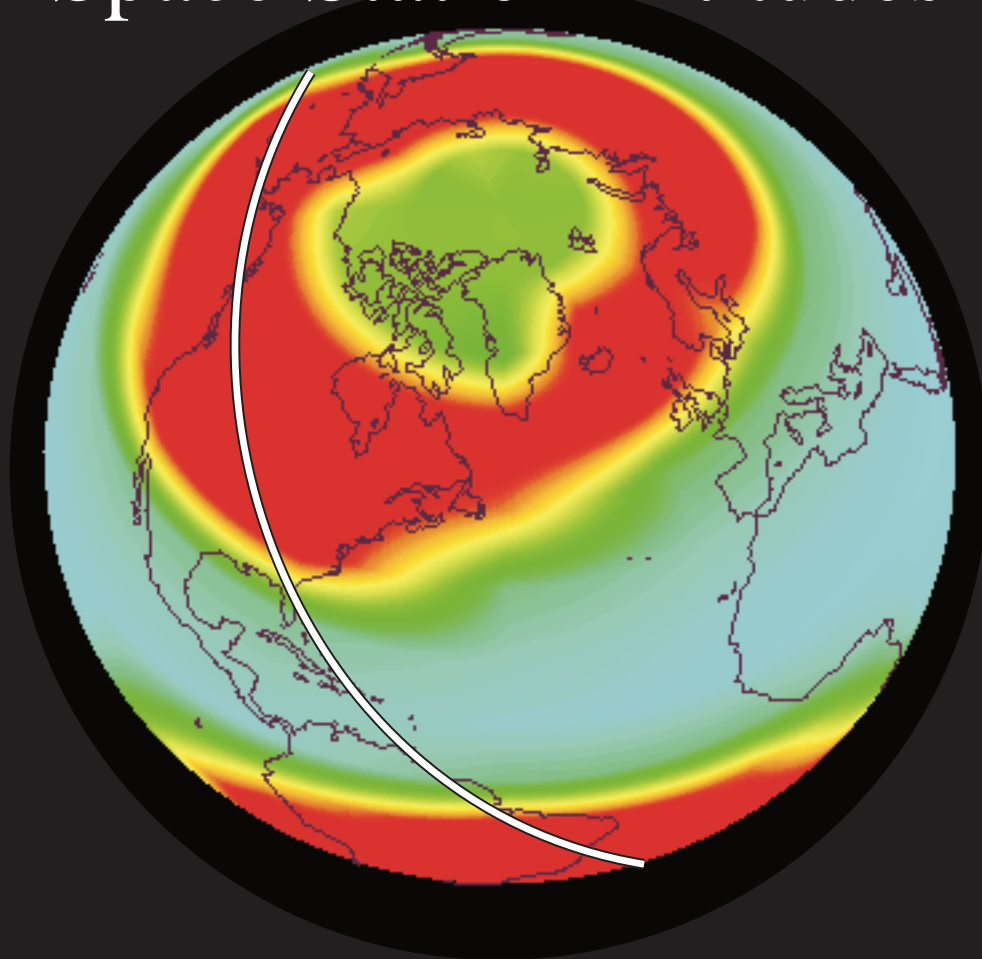
E) If enough electrons build up then, just like in a thunderstorm, there is a discharge (electrical spark) that can damage or destroy the material.

F) This is especially bad for electrical circuits.

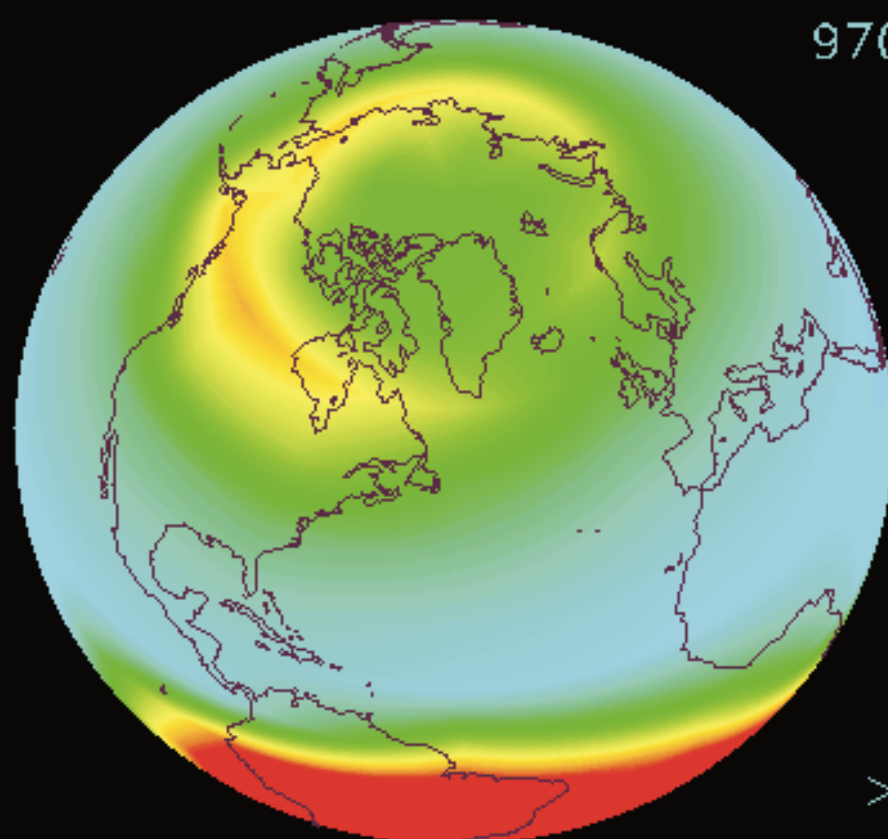
# Radiation Belts Cut-Away View



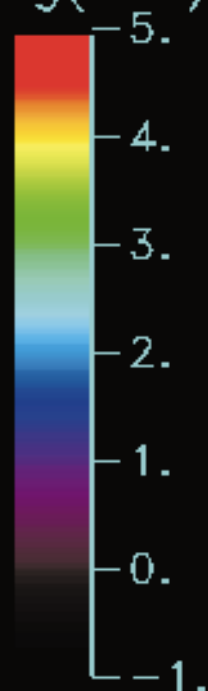
## Radiation Belts Seen From Space Station Altitudes



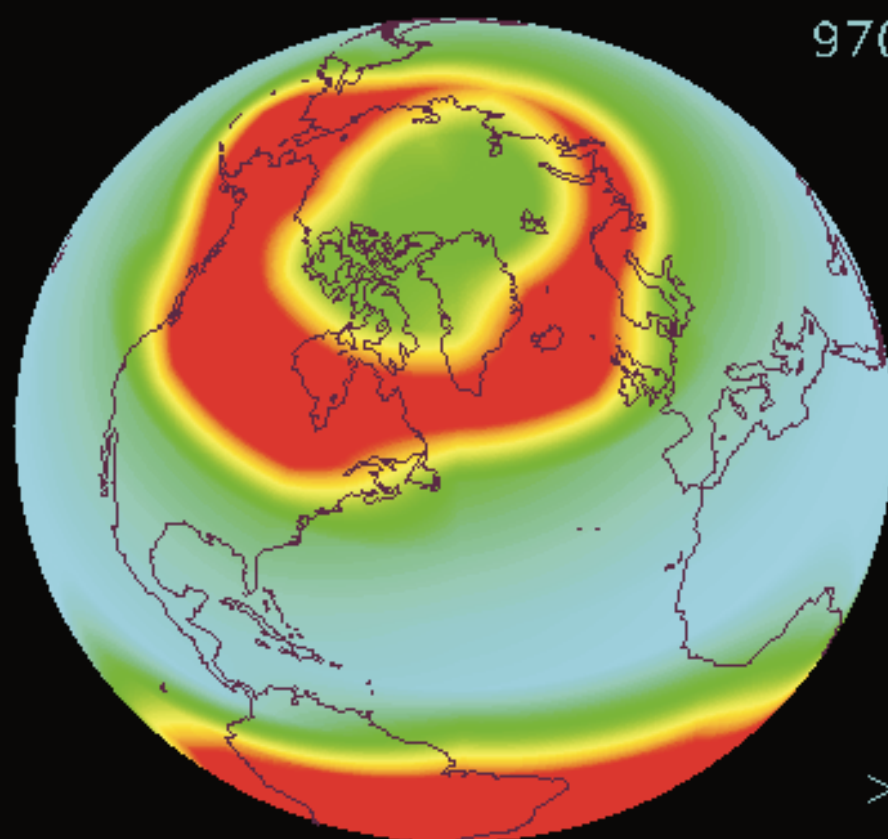




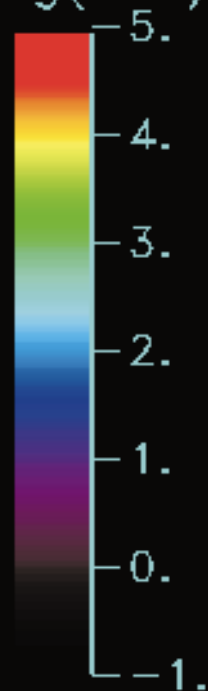
97009  $\log(\text{flux})$



> 1.0 Mev elec.



97010  $\log(\text{flux})$



> 1.0 Mev elec.

# Radiation Belt Intensity

(LANL Geosynchronous)

